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ABORIGINAL COPPER MINES OF ISLE ROYALE, LAKE SUPERIOR

By WILLIAM H. HOLMES

INTRODUCTION

In the spring of 1892 the writer was engaged in gathering material for the anthropological exhibit of the Smithsonian Institution at the World's Columbian Exposition in Chicago. It was intended that a leading feature of the exhibit in the Archeological Section should be a display illustrating the ancient mining and quarrying¹ industries of the American aborigines, and in carrying out the plan visits were made to a number of important sites in the Middle West—to the flint quarries of Ohio, Arkansas, and Indian Territory; to the site of the quartz shops at Little Falls, Minnesota; to the pipestone quarries of Minnesota; and to the ancient copper mines of Isle Royale, in Lake Superior.

Although exhibits of the collections procured through these explorations were made in due course of time, full reports of the work done and the observations made at some of the points have never been published. Papers were prepared describing the flint quarries of Arkansas and Indian Territory, and the remarkable deposits of the rejectage of implement-making left upon the associated shop sites. A brief report was also published describing excavations made on the site of the ancient quartz shops at Little Falls.

In the vast area drained by the Great Lakes and the upper Mississippi lived and labored the native peoples encountered by the early French voyagers, and later by English and Americans.

¹ The terms "mining" and "quarrying," as applied to aboriginal work, are practically synonymous.



EXCAVATION IN AN ANCIENT PIT SHOWING NUMEROUS STONE SLEDGES SCATTERED THROUGH THE FILLING

In gathering material for their stone implements these enterprising tribes discovered and sought to utilize lumps of a peculiar material, heavier and tougher than any stone with which they had been acquainted. Experiment showed that the ordinary processes by means of which stone was shaped were entirely incompetent to treat it. It could not be flaked, pecked, nor ground into shape, but in time the discovery was made that by hammering with stone sledges remarkable results could be achieved and valued ornaments and very superior implements could be shaped. These were the small masses of native copper, known as float copper, that had been torn from the massive trappean formations of the Lake Superior region by the ice-sheets and carried far down over the vast area now comprised in the states of Wisconsin, Michigan, Indiana, Illinois, and Iowa. The beginning of the use of copper by the native tribes of the Mississippi valley and the Great Lakes was due, in all probability, to the presence of these transported fragments, often folded, scratched, and rounded off, and in cases reduced, by the irresistible movements of the ice-sheet, to shapes that might be utilized to some extent as implements. We may surmise that, little by little, the aberrant fragments were traced northward to the region of their origin, where, instead of loose abraded lumps of metal, ragged masses were found fixed in the rock in place, and with the removal of these began the new and vastly important industry of copper mining in the Great Lakes region.

When the French pioneers came into the country, this work of freeing the copper bodies from the enclosing rock had gone on for a long time,—hundreds or many hundreds of years,—and really wonderful progress had been made in mining the copper, in transporting it to far-away districts, and in shaping it into implements, utensils, and ornaments.

VISIT TO ISLE ROYALE

Desiring to examine for myself the existing traces of a great native industry, I resolved to undertake a trip to Isle Royale,

since there modern mining had not so completely destroyed traces of the ancient work as on the southern shores of Lake Superior, where extensive mining operations have been carried on for many years. A very good account of the old mines has been published by Prof. N. H. Winchell, who visited Isle Royale some twenty years ago; and other men of scientific attainments—especially mining engineers—have visited the island, giving the mines some attention, but maps and photographic illustrations are entirely wanting, and the collections of artifacts made have not found their way into the larger museums.

Availing myself of the generous hospitality of officers of the Booth Packing Company, at Duluth, I took the company's steamer at that point and, sailing by way of Port Arthur, Canada, landed at a little fishing station on the rocky northwest shore of the island. This was a mile north of the mouth of McCargoe's cove, a small bay or inlet extending two or three miles into the land in a southwesterly direction. It was at the head of this inlet that the mining company had located its shipping station, and the mines, now entirely deserted, lie still a mile or two to the south. Having taken with me from Duluth one laborer and a supply of provisions and tools, I obtained a second man and the necessary rowboat from fishermen at the station, and rowing into the little cove, found comfortable lodging in one of the deserted buildings of the mining company.

At the time of my visit there were no permanent inhabitants on this part of the island, the fishermen, who are concerned entirely with the waters of the open lake, living in improvised and temporary shelters along the shore. To all appearances no one had occupied the place for many years. When headquarters were established and our housekeeping arrangements in good shape, we set out by way of an old tramway line, now completely hidden by undergrowth, to find the site of the mines. The shallow valley up which we made our way is meandered by a small stream draining into McCargoe's cove. On the right a

gentle slope rises to a low ridge, which, at most, is not more than three or four hundred feet in height, while on the left is a low, abrupt bluff, as indicated in the section (figure 73).

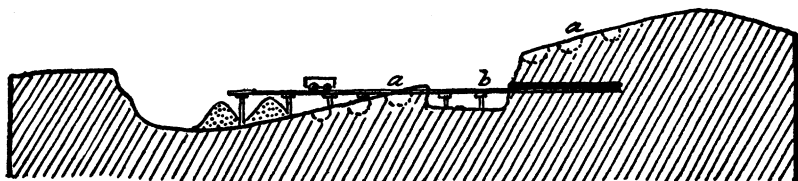


FIG. 73.—General section of McCargoe's Cove copper mines. *a*, Slope of ridge with ancient pit-tings. *b*, Modern mines with tunnel, tramway, and dump.

MODERN AND PREHISTORIC MINES

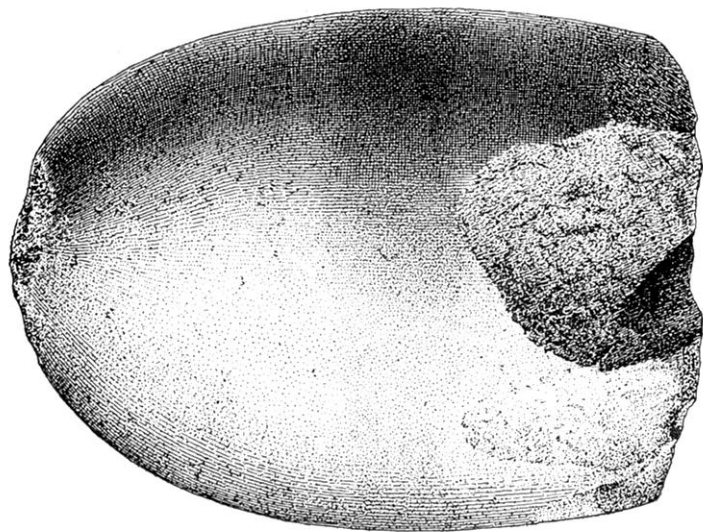
Approaching the mines we found ourselves passing the ends of lofty ridges of excavated material,—the dumps of the mining company,—and continuing in among these we encountered the remnants of workshops, engine houses, and elevated tramways, and on the right saw extensive excavations and the mouths of deserted tunnels penetrating the slope.

Topographically, this little valley and its bordering ridges are a part of a system of ridges and troughs extending, I believe, over a large portion of the island. The glacial ice-sheets pressed forward apparently along the strike of the strata, leaving the harder masses in bold relief, and, where the formations were less compact, excavating shallow valleys and depressions connecting one with another along the trend of the island, which is north-east and southwest. The deeper portions of these depressions are now occupied by ponds and swamps, and these with their alternating ridges, the fallen timber and dense undergrowth, make a country most difficult to traverse and wholly without scenic interest. Post-glacial drainage has not been active enough to modify the glacial sculpture, and the elevated portions present today the abraded and channeled surfaces left by the retreating ice. It was probably on some of these exposed masses of rock that the Indians first discovered the copper in place, since the ice, as it pared away the rock, caught the

irregular masses of metal and tore them bit by bit from their firm anchorage, leaving half-detached fragments and ragged masses exposed. But the removal of these bits of metal was no easy task. They could not be broken off nor cut by any primitive device, and the only effective means of securing them was by crushing the enclosing rock with heavy sledges and shattering it by fire until the masses were freed. When the supply thus obtained was exhausted, the tedious work of uncovering the soil-hidden surface began, and the search was continued until a large part of the superficial formations of the little valley was worked over.

The overplaced deposits appear to consist largely of vegetal mold and other finely comminuted materials, but they have been so fully worked over by the ancient miners that their original character is not readily determined. In the valleys their extent is probably considerable, but at no point where excavations have been made is a thickness of more than a few feet exposed. In ascending the slope higher up we find that the overplaced deposits occupy only the depressions between the glaciated ribs of the hill.

The operations of our modern miners, although extensive, have by no means obliterated the ancient work. All over the slopes, above and between the recent excavations, are traces of the ancient diggings, and the extent of this work was a matter of great surprise to me. As in the flint quarries previously examined, I found myself wandering over the wilderness of pits and their accompanying mounds of excavated material, marveling at the enterprise and perseverance of the aborigines. For a people with only primitive tools, the work seems colossal. A long, narrow area amounting to at least half a mile square of the surface has been worked over, pit connecting with pit, the impression given being that hardly a square rod of ground within the particular area has been left unexplored. The pits are neither so deep nor so wide as those of the flint quarries, but



STONE SLEDGES USED IN BREAKING UP THE ROCK AND FREEING THE COPPER MASSES

they do not afford a good index of the work accomplished. The earlier pits were often filled up as the work advanced, and the crumbling debris has gradually been leveled by gravitation and the growth of forests.

From the surface indications it is difficult to say how far the ancient excavators penetrated the rock in place. It is apparent, however, that there was little tunneling. The rock was too massive and refractory, save where somewhat decomposed near the surface, to permit of successful manipulation by men having only stone tools. The work of the miner consisted in uncovering the rock surface with a view of discovering protruding masses of the metal, and these, when found, were removed by crushing the enclosing rock with sledges. The deeper and larger pits probably often mark the spots where important masses of the metal were found and removed, while the smaller openings are those resulting from general and, probably in many cases, bootless exploitation. It is said that in some of the old excavations bodies of copper were found by our own miners only partially liberated from the enclosing rock, while in other cases the masses encountered were so large that native devices were not equal to their removal. Indeed, some of the masses uncovered by the white miners defied for a long time the most advanced breaking-up and transporting contrivances of a civilized age.

The pit depressions are rounded or irregular in outline and seldom are more than three or four feet in depth. Numerous examples of the battered stone sledges are in sight. The plentitude of these sledges is everywhere apparent, and it was not unusual to see them turned up among the roots of the fallen forest trees. The battered, truncated ends of the originally symmetrical water-worn forms clearly tell the story of their use by ancient men.

A very good idea of the conditions under which the native quarrying work was carried on can be obtained by studying the margins of the modern excavations. These expose the entire

thickness of the superficial and generally worked-over deposits, as well as much of the solid rock beneath.

EXCAVATIONS IN AN ANCIENT PIT

Wishing to examine the ancient pittings more in detail, I searched the walls of the modern mines for a favorable exposure in which to begin excavation, and finally selected a spot where the complete section of an ancient mine, some ten feet in depth and probably twenty feet in diameter, was exposed in a steep slope. The ancient pit was filled nearly to the top with well-compacted material, mainly crushed trap-rock and earth, the debris of excavation from this and neighboring pits. The most notable feature of these excavations was the ever-recurring sledge-hammers. Plate XXIII shows these implements projecting from the excavation face and clearly defined because of their light-colored smooth surface and entire unlikeness to the other material in the pit. The work of excavation continued until a large part of the contents of the mine was removed and complete vertical sections were exposed to view and photographed. In the plate upward of a dozen of the sledges are seen in place in the evenly-dressed front wall, and others already removed appear at the right and left in the bottom of the excavation. A silver dollar placed near the base of the front wall serves as a scale, as does also a pick resting on the bed-rock. It is seen that the rocky walls rise from the floor of the pit at an angle of about forty-five degrees, extending almost to the surface. How much of the excavated space was originally solid rock, removed by the ancient workmen, no one can say; but judging from the very large percentage of shattered trap found in the filling, and the multitude of sledges broken in the work, it is fair to assume that a considerable body of the rock in place was crushed and moved.

The discovery of considerable quantities of charcoal scattered through the mass indicates pretty clearly that fire was used to

aid the sledge in breaking up the rock. I was not so fortunate as to encounter any copper nuggets or masses in this excavation. If such were found by the miners they were not too large to be disposed of, but there were many fragments of rock impregnated with the green oxide indicating the copper-bearing nature of the formation.

The question of the disposal of the larger masses of copper encountered was no doubt a very serious one with the native miners, and when they were too large to be carried away to the shops or to distant settlements, efforts were made to break them up. All protruding parts were belabored with hammers and if possible removed, as shown by the appearance of several masses deserted by the old miners because they were too large to be in any way utilized. They bore evidence of long-continued battering with sledges. Professor Winchell, who seems to have had excellent opportunities to observe the phenomena of the pits, remarks:

“Some of the masses found, being too large for removal from the pits, show the marks of long-continued pounding, and about them in the pits are a great many small, thin chips of metallic copper, of irregular shapes, with concavo-convex surfaces exactly such as would be produced by battering a small nugget of copper to a thin layer by pounding it continuously on the same side. The finding of these thin chips of copper is the first indication to the present miners of the proximity of a large mass. In the summer of 1874, the first of these large masses was discovered. It was sixteen and one half feet below the surface, and under it were poles, as if it had been entirely detached, but it had not been much displaced. This mass was exhibited publicly in the yard of the Court-house at Detroit, and was also on exhibition at the Centennial Exposition in 1876. It was subsequently fused and sold as commercial copper. It weighed 5720 pounds, and has been described by Mr Henry Gillman in the annual volume of the American Association for the Advancement of Science for 1875. In the summer of 1879, two other large masses that had been wrought by the ancients were found at the Minong mine, which is at the head of McCargoë's cove. One had a weight of 3317 pounds, and the other 4175 pounds, the latter being about nine feet long. The largest mass yet

found at that place was taken out the previous summer, weighing six tons; but the ancients had not discovered it, though one of their drifts ran within two feet of it. The large masses discovered by the ancients show the labor that has been spent on them in their hammer-marked and pitted surfaces. They seem to have been beaten up into ridges and points, by hammering alone, for the easier removal of parts. One of those found in 1879 was not detached from the enclosing rock, though it was wholly uncovered and undermined."

STONE IMPLEMENTS

Perhaps the most constantly present and remarkable feature of these sites is the stone quarrying sledges, varying from three to twelve inches in length and from an inch to eight inches in diameter, a few specimens reaching a weight of perhaps sixty pounds. They occur in countless numbers upon the surface and in and about the pits, proclaiming the aboriginal character of the work. The bruised and shattered remnants of these sledges literally fill the ancient mining debris, as already shown, and in sections of the deposits made by recent mining operations they are seen protruding at all points, being rendered distinctly visible by their smooth surfaces and general bluish or light-gray colors contrasting with the dark earth. In places cascades of sledge-charged refuse descend into the recent mines, as shown in some of the views taken. Upward of twenty specimens had fallen into a little heap of gravel from an ancient pit at the top of the wall in front of the entrance to one of the modern mines.

The presence of multitudes of stone sledges in and about the mines tells a clear story of the character of the aboriginal work. Wooden implements would have served to loosen and remove the superficial materials, laying bare the rock surfaces and exposing protruding masses of copper, but the globular boulder-sledge could have served no purpose in the work save that of breaking up the enclosing rock and freeing the lumps of metal. Although these sledges are natural boulders rarely modified by

art, they are by no means rude affairs, or mean makeshifts. They are as perfectly adapted to the rock-crushing work as if shaped for the purpose. Doubtless they were carefully selected, and it is believed that they were brought from the beach several miles away, or, more likely, from deposits of water-polished boulders along the northern shore of the lake. Professor Winchell says:

“ They were certainly gathered as pebbles along the shore of the lake, north from the island, where there are still others of the same shapes and sizes, and of the same varieties of rock, formed on the beach by the action of the waves. The great profusion in which they are scattered among the debris of the pits would itself indicate the ease with which they were obtained. . . . The rock of which they are composed does not occur as pebbles on Isle Royale, and indeed it is doubtful if it exists at all on the island. It forms the coast of the mainland for several miles opposite the island. It is an igneous rock, usually a diabase, as shown in thin sections under the microscope, consisting essentially of a triclinic feldspar and augite, with magnetite. is Sometimes the grains are coarser, and the rock would more properly be styled a diorite or a gabbro. They belong to the formation designated by Sir William Logan *The Lower Volcanic Group*, but since styled *Animikie Group* by Prof. T. S. Hunt. Occasionally, however, the workmen seem to have gathered rounded stones of other varieties of rock, though nothing equaling the firmness of the above, and so fit for the purpose of a rude hammer in simple mining, can be selected among all the rocks of the region. One or two, of a granite containing red orthoclase, were seen at the mine, and a few of other granites are reported to have been found. These other varieties are also seen mingled sparsely with the diabase stones along the Canadian shore, and are referable to the drift forces which transported them from farther north and east in Canadian territory.”

If the theory that the boulders used in the mines came from the northern shore of the lake, ten or fifteen miles by water and perhaps two miles by land, is well founded, the question of transportation must have been a very serious one for a savage people. The number of pieces packed in from McCargoe's cove, perhaps on the backs of women, was very great, and may be estimated not by thousands but by hundreds of thousands. If the

worked-over ground is as much as half a mile square and averages one yard in depth, we have upward of seven hundred thousand square yards of implement-bearing material. An examination of the exposed pit-sections often shows as many as two or three sledges to the square yard, and this would give perhaps four times that many to the cubic yard, or some three million for the mines as a whole. A million does not, therefore, seem an excessive estimate. There are tens of thousands in sight upon the surface. Allowing three pounds each for these boulders, the material transported would amount to upward of a thousand tons.

It has been stated by a number of authors that the stone sledges were probably used in the hand without hafting. This view is due to the fact that on Isle Royale very few specimens are grooved, while on the southern side of the lake grooving is the rule. It would seem, however, that these stones held in one or even in both hands would make very ineffective tools with which to crush the solid masses of living rock. I conceive it to be quite possible to successfully withe-haft without grooving, and the fact that in many cases there is a polished band around the implement at the point where the withe would encircle it, seems to warrant the conclusion that hafting was common. It would look like a waste of energy to undertake the tedious task of pecking a groove in these boulders when the first blow struck in the quarry work might shatter the implement, making it entirely useless. We observe that the boulders chosen were generally ovoid in shape and often with the sides approximately parallel, so that withe-hafting would be easy. Two typical examples are shown in plate XXIV, the upper specimen being much battered at one end and the other at both ends. A polished band extends around the middle of the implement.

Among the stone implements found are a few forms that may properly be classed with the flaking hammers of the flint quarries. All are small and somewhat discoidal, and are flaked and

battered more or less completely all around the periphery. They could have been used in grooving sledges and in shaping or repairing other stone tools.

COPPER AND WOODEN IMPLEMENTS

Professor Winchell mentions the finding of several forms of copper tools, including a gad or bodkin, a chisel, knives, and arrowheads. He states that Captain Jacka discovered a wooden shovel or paddle which was battered on the edges as if from use in moving dirt. It is not improbable that a canoe paddle may have been devoted to this work, the form being well suited for the purpose.

DISPOSAL OF THE PRODUCT

The question of the utilization of the quarry product is a very interesting one. I was extremely anxious to discover traces of the workshops of the ancient miners and smiths, but the sites likely to have been occupied were buried in a dense growth of grass, weeds, and underbrush, and nothing could be seen. It is unlikely, however, that any considerable amount of the shaping work was conducted on the island. It seems to me more likely that the pieces of metal obtained were carried away to distant centers of population to be worked up by skilled local artisans, and we may fairly assume that a considerable trade existed in the raw material. A knotted rawhide string also was found, preserved possibly by contact with copper oxide. The articles mentioned are just such as would be used and lost or abandoned by aboriginal workmen, and serve to connect the known tribes of the lake region with the working of these mines.

MINES OF THE ONTONAGON DISTRICT

Subsequently to my visit to the Isle Royale mines I have had the opportunity of seeing something of the ancient work on the southern side of Lake Superior. At Rockland, near Ontonagon, where a vast amount of modern mining has been done, I found

the aboriginal evidences quite plentiful, and apparently identical in character with those of the more northern district. The sledges differ in being more frequently grooved, but this need not be attributed to the usages of a different people, but to the fact that the shapes of the available stones were not well adapted to hafting and had to be more or less completely remodeled to make them available; besides, the material is less brittle, making them better worth the trouble of groove-hafting. The area worked over by the ancient miners is very great, a series of sites extending all along the Copper range, and it is said by those most observant of the ancient traces that hardly a site that has yielded native copper to the modern miner was missed by the aboriginal workmen. Here, as in many other parts of the country, the remarkable enterprise and acumen of the natives are made apparent, as nothing in the way of available resources seems to have escaped them. It was in this region, no doubt, that most of the copper distributed over the Mississippi valley and the Atlantic slope originated, and here we are in the midst of the district in which copper implements are found today in greatest plenty.